AEROCITYJETS

NOTES ON FLYING THE CITATION MUSTANG
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INTRODUCTION

This document addresses information gaps faced by pilots transitioning to the Citation Mustang. There is plenty of documentation on systems, performance and standard operating procedures available. What is missing in flight training is insight into technique as opposed to brute facts.

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CHECKLIST USE FOR SINGLE PILOT OPERATIONS

Remember the checklist is just that, a checklist and not a "to do" list. Checklists are designed to fulfill the manufacturer's legal requirements, as opposed to the pilot's operational requirements. As a result, checklists do not always produce the best flow or most efficient way of preparing the airplane for its various operational phases. Consequently, you may be tempted to forgo the checklist as a safety tool choosing to rely on your memory instead. For these reasons, you should develop flows and use the checklist to check that the flow has accomplished the required actions.

We recommend adhering to the Mustang abbreviated checklist (which is actually the big checklist) for the first 100 hours of flying. After 100 hours, you can use the quick reference version of the checklist. Going to the quick reference checklist too early risks failure to complete the required items. During the earlier portions of training, the "big" checklist can function as a to-do list until you become familiar with the flows.

When a checklist is complete, annunciate aloud, even when you are alone, "……..Checklist complete." This will remind you later what has been accomplished, especially if you were interrupted. Do not run any checklists in flight below 1500ft AGL, direct aviating or monitoring the aviating automation is critical when close to the ground. If you are running a checklist on the ground, always do so with the parking brake set.

PREFLIGHT

The following preflight flow will help create a more effective, efficient and overall sticky safety protocol.

During the initial walkaround, unlock and open the main cabin door and place your flight accoutrements on the potty seat. You can tell a pilot's experience and diligence in this type of aircraft by observing the manner in which he/she opens the door and extends the steps.

Begin the walkabout, noting the position of the aircraft relative to other equipment and the prevailing wind to ascertain whether it needs to be relocated for start. If so, now is the time to let the line personnel know.

Go to the tail cone and open up the aft baggage compartment. First, connect the battery and secure the access door. Switch the baggage compartment light on and off to check the battery. Then check the aft Jbox breaker panel and the fire bottle charge. Now that you are in the baggage compartment, it is a good time to check the oil filter differential pressure indicator using that mini flashlight on your lanyard.

Leave the baggage compartment door open as you walk around the plane collecting all the "remove before flight" items. Place each of them in a carry bag that you should have in the aft baggage compartment. This includes:

- Engine covers
- Bleed air intercooler intake covers
- Static wick protectors
- Pitot covers
- Static covers (sometimes installed)
- Stall warning vane cover

The last three should be separated from the first bunch, as they will not be placed in the baggage compartment but in the aft pocket of the right-hand rear-facing passenger seat with the tags showing. This allows you to look over your shoulder during a paranoid moment to see they have actually been removed (such as before testing the pitot-static heat or before takeoff).

Once the items are stowed in the aft baggage compartment, lock the door.

Now check the oil level on the left engine, walk around the right side, and check the oil and the differential pressure indicator there.

Moving to the front of the plane, check the O2 blowout disk and open the left nose baggage compartment in this order:

1. Unlatch the red safety switch
2. Unlock the key and then, deliberately and not quite simultaneously, open both latches.
3. Check the gear blowdown bottle charge and the emergency brake bottle charge.
4. Now latch, lock and secure the right nose baggage compartment door.

Using the same method as the right door, open the left baggage compartment door and check the hydraulic reservoir level and accumulator precharge by draining the hydraulic accumulator.

Now latch, lock and secure the left nose baggage compartment.

Upon returning to the cabin, remove the lanyard from the emergency exit and place it along with the pitot, static and stall warning covers in the aft pocket of the right rear-facing passenger seat.

Now you can make your way to the pilot seat and get yourself ergonomically organized.

Execute the cockpit/cabin preliminary inspection, ensuring you don't have the pitot heat and lights on too long (especially if you are doing a battery start).

Once this portion of the checklist is complete, ensure everything is turned off. You can now do the exterior portion of the preflight, excluding the front and aft baggage compartment items, oil and differential pressure indicators.

The cockpit preparation portion of the checklist should be accomplished as soon as practical before your passengers arrive. This avoids rushing through them later. Remember that without a GPU, a good portion of the checks are done with the battery off, saving it for the start. Without a GPU, I also suggest not spending too long getting the ATIS, clearance, and programming the FMS. Leave some or all of this until after start.

ENGINE START

Prior to engine start, you should see four or five (depending on whether ADSB is installed) CAS messages for a battery start and three for a GPU start. For a GPU start check there should be a minimum of 28 volts, and for a battery start a minimum of 24. Ensure the air conditioning is off for either type start.

The first engine start should be alternated unless operational reasons suggest otherwise (such as turning on the right engine to run the air conditioning prior to passenger embarkation).

Start the timer immediately prior to engine start so you can measure the 10 seconds max until ITT rise and 45 seconds to a stabilized idle.

The throttle should be immediately lifted above the gate after pressing the start button. (No need for a minimum N_2 as in older planes.) Your right hand will remain on the throttle, ready to cut off if necessary in the event of exceeding any operating limit.

Upon beginning the engine start process, the following should be checked in order:

- N_2 (bottom right)
- Ignition (top right)
- ITT rise (middle right)
- Fuel flow (bottom left)
- N1 (top left)
- Oil pressure (middle left)

You know the start has been successful when the N_2 digits change from white to green and the start light and starter disengage light are extinguished.

You should now check the battery amps are below 100 prior to starting the second engine.
For a cross generator start, it is required to increase the power on the operating engine to 60% N_2. A good start to get the required N_2 increase is to use your forefinger to set the gap in the throttles.

After starting both engines, it is good to develop a flow for the rest of the checks:

- Avionics master on
- Generator and battery checked
- Windshield anti-ice as required
- Glare shield cooling fans
- Air source select knob
- Environment controls
- Flaps
- Speed brakes
- Trims
- Flight control

BUILD IT, BACK IT, BUG IT, BRIEF IT

Build it refers to the FMS and NAV programming; e.g., placing the departure/approach procedure in the G1000 flight plan (magenta world).

Back it refers to backing up 'magenta world' with the appropriate underlying traditional nav aids (green world) assuming that the GPS signal may fail or your FMS programming may be having an off day.

Bug it refers to using the heading and altitude bugs and the speed bugs for the appropriate V speeds.

Brief it refers to the departure briefing or approach briefing.

BEFORE TAXI /BEFORE TAKEOFF CHECKS

For the before taxi checks, bring up the timer/reference box on the PFD. Set the takeoff references and turn them on. If the takeoff references fall into the default settings, the quickest way to turn them on is to press the menu button, scroll to the bottom and two clicks back with the FMS knob, and select "takeoff refs on."

On the minimums section, select 700ft above your current altitude (this is the altitude at which you may turn your autopilot on).

Scroll down and input the destination field elevation (can be quickly found on the MFD WPT chapter APT page, then MENU button "View Destination Airport").

Once the timer reference window is populated, scroll to the radar page on the MFD (MAP chapter page 3), place the radar to standby using the softkey.

Now you can check that you have completed everything using the after start and before taxi checklists.

Remember to call, "……Checklist complete" when a checklist is finished, especially when flying single pilot.

For single pilot operations, it is advisable to complete the before takeoff checklist to the line prior to taxiing.

Ensure your FMS (flight plan) is set up, initial cleared altitude is set, heading bug to departure runway heading, and the flight director are set.

To set the flight director, press the TO/GA button and select either HDG or NAV mode depending on the nature of the departure.

The **takeoff briefing** should contain three main elements.

1. A summary of the departure, including course and initial altitude along with anything about the takeoff that is nonstandard (flaps up or anti-ice on)

2. Actions in the event of an abnormality before V_1, (brakes, throttles, speed brakes)

3. Actions in event of an abnormality after V_1, (route, acceleration altitude, altitude)

During single pilot operation, engage the parking brake when at a full stop (with the exception of "position and hold" on the runway).

Always keep your attention outside the aircraft whenever you are moving or when the parking brake is released. Never run a checklist when moving (on the ground anyway!)

Accept a clearance to take off only when you are ready.

TAKEOFF

When you are cleared to take off, the below the line checks are accomplished by a flow starting with the windshield anti-ice to on, pitot static heat on, and all lights on except the wing ice inspection light.

If you are instructed to line up and wait, then run the flow without the anti-ice items and turn them on when you are cleared for takeoff.

Prior to beginning to advance the throttles, check that the CAS messages are clear.

When advancing the throttles, move them up approximately halfway and check that both engines are spooling evenly.

Then advance the throttles to the takeoff detent. Check that the actual N_1 is close to the TO N_1 bug.

Call out, "Takeoff power set" and then, "Takeoff power made."

As the airspeed comes alive on both PFDs, call out, "Airspeed alive and crosschecked."

As the airspeed passes 70kts, call out "70 knots."

At V_1/V_R, call out, "V_1 Rotate."

At V_1, remove your hands from throttles and use both hands to rotate.

During the rotation, pitch to the flight director bars or if none present themselves, pitch to 10 degrees nose up. The pitch up should be smooth, at an approximate rate of 4 degrees per second.

During the rotation, begin to scan the slip skid indicator so you maintain control in the event of an engine failure. **"10 degrees, sailboat"** is a common mantra. (Sailboat refers to keeping the boat under the sail on the slip skid indicator.)

Upon ascertaining a positive rate of climb on the VSI, call out, “Positive rate” and retract the gear. Return your right hand to the yoke.
On accelerating through 110kts, call out “110 knots” and retract the flaps.

Once the flaps are retracted, monitor the attitude of the aircraft and the resulting performance in this critical phase of flight. Once everything is working out as you expect and as you get close to the 700ft above airport bug on the airspeed indicator, select FLC on the mode control panel.

The airlines use a process called **VVM,** (verbalize, verify and monitor). This is especially important when using a flight director/autopilot mode control panel. So **v**erbalize “flight level change,” **v**erify on your “scoreboard,” (the flight director autopilot annunciation panel on the top of the PFD), and **m**onitor the aircraft behavior.

Selecting FLC during the climb will cause the flight director bars to pitch for the IAS the airplane was at when the button was pressed. This speed will be shown on the scoreboard as well as indicated on the ASI. The speed you want is 150kts for a regular two-engine climb. When you press the FLC button as you approach 700ft AGL, you should be approximately 150kts. When the aircraft passes 700ft above the departure elevation as indicated by the minimums bug passing on the altimeter, engage the autopilot on the MCP, check on the scoreboard that the autopilot is indeed engaged (VVM), and now reduce the throttles to the climb detent (verifying on above the N_1 gauge). Now to select exactly 150kts FLC, place your hands on the right-hand bend of the glareshield and use your thumb to roll the wheel nose up/down to decrease/increase FLC to 150.

DEPARTURE

During this initial climb phase, it is likely that the tower will require you to change frequency to departure. You should of course acknowledge and flip the frequency over to departure. Do not initiate conversation with ATC until the aircraft is on autopilot and the thrust is set to Climb. This will allow you time to complete your flow and be ready with pen and paper if ATC changes your instructions.

The after takeoff checklist is straightforward. With the exception of what has been executed with your flow, you must ensure that the aircraft pressurization system is working correctly by checking the increasing differential pressure. Other than that, the only other physical act required is to adjust the external lights.

The plane should continue to climb at 150kts until the following is completed:

- The aircraft is above obstacles.
- The after takeoff checklist is complete.
- The aircraft is generally going in the correct direction to the destination.

Once the above are satisfied, roll the MCP wheel to select 170kts in FLC.

SETTING SPEED WITH FUEL FLOW

In the case of an intermediate level offs during the climb, select 400lbs per side fuel flow in lieu of an N_1 power setting (unless CRU setting gives a lower fuel flow). This ensures that the airplane

will not overspeed in cruise flight while managing fuel flow for flight planning purposes to 800lbs per hour. If you are speed restricted to 200kts IAS (e.g., under B airspace), a reference fuel flow of 370lbs per side will do the trick. If fuel consumption is not an issue and flying as fast as you can is the plan, then 450lbs per side is a good reference.

Fuel flow is the best method of gauging IAS as it provides the best correlation between a referenced EICAS setting and indicated airspeed.

During the climb, maintain 170kts until at approximately 30,000 feet as the IAS should automatically change to Mach. This transition normally results in a Mach number of .48. You can maintain Mach .48 until the climb rate drops to less than 500fpm. When that occurs, recycle the climb speed to Mach .46 and if necessary again to Mach .44. If you can no longer climb at Mach .44, you need to level off or request a lower altitude (shame on your flight planning)!

CRUISE

Once you level off, start your timer so you know when you have been 10 minutes level in Climb power and it is time to reduce to cruise power. Run your cruise checklist.

Once established in cruise at CRU power, you should do the following:

- Check the weather and updated TAF at your destination on the XM.
- Check the legitimacy of the loaded flight plane route on the FMS and the total assumed route to the destination.
- Check the en route winds vs. the winds you have currently.
- Calculate your estimated landing fuel to ensure it meets your required margins.
- Calculate your estimated landing weight and look up the appropriate Vapp and Vref and stall warn high data if icing conditions are suspected.
- Load these into the timer reference window.

Do not use the fuel range ring to ascertain if you have enough fuel. This is based on your current fuel flow (which could be as low as 230 per side per hour at high altitude high OAT cruise), current groundspeed (which is affected by the current winds aloft) and assuming no ATC delays.

A better reference is to associate 800lbs with a low-altitude hour reserve. You can check this in the first page of the auxiliary chapter, and of course that is based upon the route currently in your flight plan.
Be aware that when flying into a busy metropolitan area, ATC is likely to descend you early, resulting in lower true airspeeds and increasing fuel burn.

Descent planning is important in a jet. Considering you can be flying 7 miles high, it is good to have an idea of the optimum time to descend. To help with this, place 1500ft AGL beside the destination airport and an angle of 3.5 degrees for the required vertical profile. If the arrival segment includes a star, place the expected crossing restrictions in the flight plane with the 3.5-degree angle.

Remember that setting power with fuel flow figures during an arrival will help hit target speeds on the STAR.

APPROACH

Remember to use **Build it, Bug it, Back it and Brief it** on your approach procedure. A sample approach briefing is on page 12 of this document.

When arriving in the terminal environment and within 20 miles of the destination airport, 65% N_1 is a good reference. This should realize a speed of approx 180kts (which allows the flaps to be deployed at will). Descents should be executed using VS mode on the MCP and verified in the scoreboard. Using a 1500fpm rate of descent at flight idle will result in the 65% N_1 level flight speed being maintained in the descent, while ensuring the plane does not get behind the descent profile.

Note that these procedures are valid with the engine anti-ice off. When the engine anti-ice in on, flight idle is increased up to an N_2 of 70% resulting in a higher indicated airspeed for a given descent rate. This can serve as a handy reminder that the engine anti-ice is still on, as there are no indications other than switch position.

Once the aircraft is within 10 miles of the FAF or equivalent and icing is not a factor, place the flaps in the takeoff/approach position. At 65% power, this will result in approximately 150KIAS and the 1500fpm descent at flight idle will also maintain this speed.

STRAIGHT-IN APPROACHES

For an ILS/precision-type approach, place the gear down one dot above, select 50% N_1 and Flaps to landing at glideslope intercept. Leave the flaps to takeoff/approach in the case of a circle to land, stall warning high (ice on the aircraft) or a single engine approach. In these cases, the power will have to be adjusted to maintain Vapp +10kts.

On a straight-in, nonprecision approach with no vertical guidance, place the gear down while maintaining 65% power 3 miles from the final approach fix. Once the MDA is in the altitude selector and you are passing the FAF, command a 1000fpm descent, throttles 40% N_1 and flaps landing. This should realize an approach speed of Vref +10. Upon the airplane beginning its level off at MDA, set 65% power.

Once the altitude is captured and speed stabilizing at approximately Vref +10, place the missed approach altitude in the altitude selector.

CIRCLING APPROACHES

Circling approaches are dealt with as if they are nonprecision approaches irrespective of whether they have vertical guidance. The autopilot should be on until you decide to descend below MDA. This allows you to manage the circling maneuver to maintain at or above MDA and keep within the required distance from the runways. It also allows capacity to be prepared for the missed approach if that should prove necessary.

Place the minimums into the altitude selector as if it were a regular nonprecision approach.

On an approach to a circle, the aircraft should automatically level off at MDA as the aircraft will be descending in VS mode with altitude standing by and set on the MDA.

Once established at MDA with speed stable at a minimum of Vapp +10 (set approximately 65% N_1), place the missed approach climb to altitude in the altitude selector. Once leaving MDA to descend to land, disconnect the autopilot and place flaps to landing (if appropriate).

MISSED APPROACHES

In the event of a missed approach, call out, “Missed approach,” set takeoff power while pressing the GA button, pitch to the flight director and set flaps TO/APR. Upon a positive rate of climb, retract the landing gear and move your hand up and press NAV on the mode control panel. These actions are always the same when executing a published missed approach for a one-engine/two-engine/ice/no ice approach.

During this process (as in the takeoff) setting takeoff power and controlling the attitude and slip skid are your primary concerns.

Pressing the NAV button effectively takes the brainpower out of navigating and allows you to concentrate on aviating. This works every time as long as you have previously accomplished the following:

- The approach was activated.
- The climb to missed approach altitude was set prior to going missed.
- The go around button was pressed.
- The missed approach was executed at the missed approach point.

Communicating should not be considered under single pilot until the autopilot is engaged.

Once the NAV is engaged and climbing out on two engines, ensure the speed is a minimum of 110kts and then select flaps up. Then FLC 150kts and engage the AP at a minimum of 700ft above the ground. Once the AP is engaged, place the power to climb and execute the go around checklist.

When climbing out on one engine, engage half Bank, FLC Vapp minimum and leave the flaps in the TO/APR position. Once at a minimum of 700ft AGL, engage the AP. When arriving at the higher of 1500ft AGL or MSA, roll the FLC to Venr (118), retract the flaps at Vapr +10 and place the throttles at climb power. You may now run the single engine go around checklist (AC1).

When leveled off on the way to the MAP hold, select 60% power clean (weight, altitude and temperature dependent); there is no reason to go nowhere fast and burn fuel in the interests of parasitic drag. This will give you the best chance for ample fuel to divert if necessary. Remember, 160kts is the minimum speed in icing conditions.

AFTER LANDING

Upon landing in the Mustang, do not action any configuration change on the runway during rollout.

Clear the hold short lines, set the parking brake and run a flow check - de-icing (green switches), lights (anti cols off and landing light to taxi) and flight controls (flaps up, speed brakes retracted and trims neutral.

If ATC asks you to switch to ground, you should monitor ground and initiate communication only once your after-landing checklist is complete (this is further to the flow check). When you do initiate communication, have a pen in hand to copy taxi instructions.

When parking for shutdown, be aware of the tailwind component limits for restart if necessary. Upon shutdown, ensure the parking brake is set prior to being heads down with the shutdown checklist. After the airplane is chocked and the engines are shut down, release the parking brake so the airplane may be towed if necessary. Place a sign in the windshield indicating the parking brake condition. The battery should be disconnected for any prolonged period of inactivity.

Line guys/gals can be your best friend. As well as providing great service, they take care of the plane and their diligence is a great asset to safety. Please remember to tip as it will pay you back many fold.

DEPARTURE BRIEFING

Single Pilot Long Runway

This is a normal/flap up/anti-icing on takeoff from Runway 30 LGB.

We will fly runway heading to 1500ft, then turning left heading 180 with radar vectors to SLI. Initially climbing to an altitude of 3000ft.

If there is any abnormality prior to V_1, I will abort the takeoff.

After V_1, I will take the issue into the air climbing to an altitude of 1600ft following our clearance and deal with the problem as an in-air emergency. In that case, we will plan on returning to Long Beach on the ILS to runway 30.

Crew or Single Pilot with Runway less than 150% or that required

This is a normal/flap up/anti-icing on takeoff from Runway 30 LGB.

We will fly runway heading to 1500ft, then turning left heading 180 with radar vectors to SLI. Initially climbing to an altitude of 3000ft.

If there is any abnormality prior to 70 kts, I will abort the takeoff.

Between 70kts and V_1, I will abort for a red light, loss of control or any safety of flight issue.

After V_1, I will take the issue into the air climbing to an altitude of 1600ft following our clearance and deal with the problem as an in-air emergency. In that case, we will plan on returning to Long Beach on the ILS to runway 30.

Prior to V_1 either of us will call ”Abort abort abort” to reject the takeoff.

Any Questions?

APPROACH BRIEFING

This is the **ILS 30** approach to **Long Beach** dated **22 October 2009**. We are speaking to SOCAL approach on **125.35** with the tower frequency of **119.4** ready on COM2.

The localizer frequency of **110.3** is set with a final approach course of **301** on NAV1. The localizer has been identified **I-LGB**.

The platform altitude is **1600ft** crossing **BECCA** at **1537ft**. The marker beacon receiver is on.

Based on Category B minimums our **DA** is **250ft** with a visibility of **½ mile.**

We are expecting a **MALSR** approach lighting system with the **PAPI** on the **left-hand side.**

Upon landing, we will be **exiting the runway to the left.**

On a **missed approach**, we fly **straight ahead to 800ft**, then a **left turn heading 200** and **intercept the LAX 145 radial outbound to PADDR** with a **teardrop entry** to the hold. On the missed approach we will **climb to 2600ft**

Any Questions?

PASSENGER BRIEFING ELEMENTS

- Use of seat belts, seat positions and tray tables
- Lighted placards
- Location and use of exits (2)
- Passenger oxygen
- Location of fire extinguisher and first aid kit
- No smoking
- Passenger briefing cards

We hope you found this document useful in your Citation Mustang training. If you have suggestions for additional information that should be included, please email info@aerocityjets.com with “Citation Mustang Manual” in the subject line.